PHENIX Detector Electronics Racks and Time Of Flight Sector Fire Alarm System

procedure name

PHENIX Procedure No.PP-2.5.5.6-04

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Hand Processed Changes

HPC No.	Date	Page Nos.	Initials
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Approvals

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PHENIX S E & I Date

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PHENIX Safety Date

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Fire Protection Engineer Date

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Cognizant Scientist/Engineer Date
/Activity Manager

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CA-D ES&H Date

1. Purpose

This test procedure will verify that the PHENIX "Notifier" fire alarm panel is operational and capable of sensing smoke in the designated detection zones. It is intended to be an inspection, testing, and maintenance document for the Notifier system which monitors for smoke in the Phenix Electronics racks and the ToF Sectors. The Notifier panel, under certain conditions, also activates a releasing circuit which opens an Inergen supply valve to admit Inergen gas into both Time Of Flight Sectors.

2. Responsibilities

The Phenix Electronic Facilities & Infrastructure (EF & I) Group is responsible to perform this test in cooperation with the BNL Fire Alarm Group. Fire alarm technicians are required to be present for monitoring and re-setting fire panel 189 and 212 alarms .

3. Prerequisites

- Only system specialists will implement this procedure (P.Giannotti, J.Haggerty, F. Toldo) and approved by Phenix and or CAD. Certain Safety System Interlock functions are required to be bypassed (disabled) while performing this procedure. Notify the liaison engineer for authorization to bypass trips and for access into the Phenix Bypass Cabinet

- This procedure can only be performed during shutdown periods of the Phenix detector.

- This procedure shall be performed as close as possible to the beginning of each Phenix detector run.

4. Precautions

The use of a bypass on any system shall be analyzed for safety ramifications and may not be bypassed if the system is put in an unsafe state. Authorization from CA-D may be required for a bypass from the as configured state. Consult the liaison engineer for authorization.

The wires will be **disconnected to the Inergen valve** during performance of this test

Procedure

Notify the Phenix shift leader prior to commencing this procedure. The fire alarm bells and strobes will remain active. Prior to activating the alarm bells each time, make announcements on the Building 1008 complex PA system.

5.1 Battery and charger test. A battery and charger unit supply 24 volt power to the Notifier panel and are contained inside the panel.

5.1.1 Visually inspect batteries for corrosion or leakage. Check and ensure tightness of connections. Also, check for any bulges or distortions in the battery cases.

Caution: Prior to completing the next step, perform the following:

a) Enable trip bypass: TOF Sector 0, 2/2 High Smoke (switch #1-5) located in the Phenix Bypass cabinet by turning the switch to the on position.
b) Enable trip bypass: TOF Sector 1, 2/2 High Smoke (switch #2-1) located in the Phenix Bypass cabinet by turning the switch to the on position.

c) Disconnect the Inergen supply valve power wires inside the Notifier panel by pulling the plug connector on terminal block TB-7.

5.1.2 Interrupt AC power to the Notifier panel/charger by opening circuit breaker #26 in breaker panel DPA-2.
Measure the battery terminal voltage while it is supplying load to the Notifier system. Replace the batteries if the voltage is less than 23.1 volts DC.

5.1.3 Restore AC power to the charger by re-closing circuit breaker #26 in breaker panel DPA-2. Verify restoration of green light and clearing of "Loss of power" display.

5.1.4 Disconnect the batteries from the charger by pulling the leads off the batteries.

5.1.5 Measure the individual battery voltages. Replace all batteries if any individual battery reads below 12.1 volts DC. Reconnect batteries to the system. Verify clearing of "Loss of battery" alarm.

5.2 Smoke Detector Zone Tests

There are 73 photoelectric smoke detector zones contained in electronic racks/enclosures in the Phenix experiment. There are 4 smoke detector zones contained in the TOF sectors. Refer to attachment 1 for a list of the zones. Test each zone by using the approved (Home Safeguards) smoke detector aerosol or trip each detector using a permanent magnet. Each zone will be displayed on the Notifier panel readout. Verify proper zone identification.

5.3 TOF Inergen Releasing Circuit Verification Test

The Time Of Flight sector electrically actuated Inergen valve will fire to release Inergen into the TOF sectors when both the A and B smoke detectors inside either sector sense smoke. This test will not verify the actual firing of the valve. It will test the function of the Notifier Fire Alarm panel to activate the releasing circuit output. This is verified through reading the correct polarity and value of the DC voltage present on the wire terminals which connect to the Inergen valve. The wires will be disconnected to the Inergen valve during performance of this test.

5.3.1 Reset all alarms indicating on the Notifier fire alarm panel. Ensure the plug connector on terminal block TB-7 remains disconnected. Verify that minus 2.4 volts DC exists on teminals B+ and B- of terminal block TB-7.

5.3.2 Trip the A and B smoke detector inside TOF sector 0 by using smoke spray or the smoke detector test magnet. Verify that plus 24 volts DC exists on terminals B+ and B- of terminal block TB-7.

5.3.3 Reset the Notifier panel alarms. Clear the Fire Alarm Panel of alarms. Again, verify that minus 2.4 volts DC exists on teminals B+ and B- of terminal block TB-7.

5.3.4 Trip the A and B smoke detector inside TOF sector 1. Verify that plus 24 volts DC exists on teminals B+ and B- of terminal block TB-7.

5.3.5 Reset the Notifier panel.

5.4 Alarm Notification Device Test

This section will test the building alarm bells and strobe lights. It will also verify receipt of the building 1008 alarm (zone 31) at the BNL Fire House Alarm Panel.

5.4.1 On the Inergen supply header, actuate the Inergen pressure switch. Verify that the alarm bells and strobes are activated in the following 1008 areas:

a) 1008A Phenix Control Room
b) 1008A Counting House Rack Room
c) 1008A Utility Room Corridor
d) 1008A External Wall Of Building
e) 1008A Assembly Hall

f) 1008A Intersection Region (IR)
g) 1008E Office Trailers
h) 1008F Gas Mixing House

Also, verify that Zone 31 alarm is received at the BNL Fire House.

Return Phenix Inergen and Notifier Fire Alarm System to normal operation. Reconnect the ToF Inergen valve connector on TB-7 in the Notifier panel. Verify that all alarms on the panel are clear.

5.4 Return all system bypass switches to the off position. Verify that Phenix control room alarm "Phenix bypass active" number A 6-8 is clear.

5.5 Notify Phenix personnel that the test is complete.

Attachment 1

Phenix Detector Electronics Racks Smoke Detection Zones

1)	Zone 1	Rack WCB-1
2)	Zone 2	Rack WCS-11 LV
3)	Zone 3	Rack WCS-12 RICH FEM
4)	Zone 4	Rack WCS-13 HV
5)	Zone 5	Rack WCS-14 HV PbSc
6)	Zone 6	Rack WCN-11 RICH FEM
7)	Zone 7	Rack WCN-14 HV
8)	Zone 8	EMCAL W.0
9)	Zone 9	EMCAL W.1
10)	Zone 10	BB1 FEM (inboard)
11)	Zone 11	BB2 FEM (outboard)
12)	Zone 12	MVD
13)	Zone 13	ECB
14)	Zone 14	ECS-12 TEC FEM
15)	Zone 15	ECS-13 PbGl
16)	Zone 16	ECS-14 RICH FEM
17)	Zone 17	ECS-21 TOF FEM
18)	Zone 18	ECS-22 PbGl
19)	Zone 19	ECS-31 TEC FEM
20)	Zone 20	ECS-32 LV
21)	Zone 21	ECS-42 TOF HV
22)	Zone 22	ECS-43 HV

23) Zone 23 ECS-44 HV
24) Zone 24 ECN-13 RICH FEM
25) Zone 25 ECN-11 TEC FEM
26) Zone 26 ECN-14 PbGl LV
27) Zone 27 ECN-21 PbGl LV
28) Zone 28 ECN-22 TOF FEM
29) Zone 29 ECN-31 LV
30) Zone 30 ECN-32 TEC FEM
31) Zone 31 ECN-41 TOF HV
32) Zone 32 ECN-43 HV
33) Zone 33 EMCAL E.0 A
34) Zone 34 EMCAL E.0 B
35) Zone 35 EMCAL E.1 A
36) Zone 36 EMCAL E.1 B
37) Zone 37 EMCAL E.2
38) Zone 38 MuID.S HV
39) Zone 39 MuID.S FEM
40) Zone 40 ECS-11
41) Zone 41 ECS-41
42) Zone 42 ECN-12
43) Zone 43 ECN-42
44) Zone 44 SMT-1
45) Zone 45 SMT-2
46) Zone 46 SMT-3
47) Zone 47 WCN-12
48) Zone 48 WCN-13
49) Zone 49 EMCAL E.3
50) Zone 50 EMCAL W.2
51) Zone 51 EMCAL W.3
52) Zone 52 WCB-2
53) Zone 53 NMT-1 - Bottom
54) Zone 54 NMT-2 - MID
55) Zone 55 NMT-3 - TOP
56) Zone 56 NMI-1 - HV
57) Zone 57 NMI-2 - FEM
58) Zone 58 FCAL.N
59) Zone 59 FCAL.S
60) Zone 60 ECN-44
61) Zone 61 Level 1 Trig. PRR 3.1
62) Zone 62 Timing Rack PRR 3.5
63) Zone 63 Level 1 Trig. PRR 3.2
64) Zone 64 DCM Rack 0 PRR 4.1
65) Zone 65 DCM Rack 1 PRR 4.2
66) Zone 66 DCM Rack 2 PRR 5.1
67) Zone 67 DCM Rack 3 PRR 5.2
68) Zone 68 DCM Rack 4 PRR 5.3
69) Zone 69 DCM Rack 5 PRR 5.4
70) Zone 70 TOF Sector 0 (Det A)
71) Zone 71 TOF Sector 0 (Det B)
72) Zone 72 TOF Sector 1 (Det A)

73) Zone 73 TOF Sector 1 (Det B)